Matan Shtepel, UCLA, Theoretical Computer Science.
*Note: I will submit/have submitted this as the diversity essay for some of my PhD applications*

## *CC→PhD: my personal experience*

While I consider my journey from community college to research successful, statistics suggest that the vast majority of community college transfer students do not share my experiences. To be precise, while *45% of bachelor degrees in STEM have attended community college*, only *5.7% of STEM PhDs started at community college*. To spell it out explicitly, ***Given that a student attended community college before getting a STEM bachelors at a four-year university, she/he is approximately 13x less likely to complete a STEM PhD than if she/he started her/his education at a four-year institution.*** (calculations can be found on my website). Hence, the question begs: what is filtering nearly half of all Americans, largely based on socioeconomic status, from joining the scientific community? Moreover, what can be done to remove this filter? While full answers to these questions are impossible to devise, by providing my personal story, I hope to illuminate what are the barriers that community college students face and how we might alleviate them. Lastly, I'll mention the actions I've been taking to ease these challenges in my local sphere and note what I hope to do in the future to further enable community college students to drive cutting edge research.

As bizarre as it may sound, the year I spent online at Las Positas Community College during the pandemic was, by coincidence, the most transformative year of my life. Throughout the year, under the Zoom-guidance of my splendid physics instructor, Dr. William Pezzaglia, I was first exposed to the academic world. Learning a few graph algorithms and implementing a simple graphics system in Python, I was lucky enough to discover my purpose and joy in theoretical computer science. Petitioning for extra-extra courses and enrolling in 3 schools simultaneously, I graduated from community college in a year and transferred to UCLA, determined to contribute to the ever growing pool of human knowledge.

Yet, at my new four-year institution, I found no path to take me from a community college transfer to a strong PhD applicant. That is, the transfer center focused on expensive masters programs in their grad-oriented events, the academic counselors vetoed my plan to take five technical courses, the panelists at research expositions were four-year students, and all the labs/groups I applied for dismissed my community college projects and uniformly rejected me. To my disappointment, kind suggestions to "reapply once I gain some seniority on campus," or "push some math courses to next summer" made it clear the system was not prepared for guiding transfers to their PhD aspirations.

Moreover, finding my trajectory was the smaller out of the two obstacles I had to climb— additionally, I had to close the gap with other PhD applicants. These PhD applicants, having spent two full years at a four-year university, already had the opportunity to take specialized graduate courses, form connections with faculty, and get started on novel research. Moreover, through elite high-schools, challenging technical competitions, and prestigious summer programs, it seemed they were groomed for academic achievement from adolescence. Thus, without knowledge of any community college transfer who caught up to these talented students in a meager year

and a half, my task seemed impossible. Meanwhile, taking loans to stay another year at UCLA seemed irresponsible. Sadly, it seemed I may have just found my passion too late.

Still, realizing that even if I inevitably fail, I would look back at my work with pride, I decided to try and pave my own path, compressing three years of research into one. Hence, I signed up for UCLA's summer-session algorithms course and started working on a (slightly) tighter upper-bound for the Gale-Shapley Algorithm than was stated in our textbook (Kleinberg's "Algorithmic Design"). Then, leveraging my improvement, I convinced Dr. Mark Burgin, the course's instructor, to take me on as his research protégé. With Dr. Burgin, I explored an interesting question in computability theory on which we were eventually able to make progress. While in the literature, our achievement was small, in my mind, it was astonishingly motivating.

At the beginning of fall quarter, after self-studying UCLA's undergraduate theoretical CS curriculum and earning a minor publication, I was overjoyed when Prof. Rafail Ostrovsky agreed to give me a treasured spot in his graduate cryptography class, and subsequently, an even more treasured role on his research team. While at first, I was hardly keeping up with the skilled team, through simultaneously enrolling in 5 pure math classes, discussing my difficulties openly, studying the problem-solving methods of my collaborators, and doing *a lot* of extra thinking on my own time, about 3 months into the project, I managed to contribute an important piece to our protocol. Admittedly, proving to my collaborators that their investment in me was just has been the most fulfilling proof I have written to date.

Almost a year later, I am extremely proud to say I have contributed my fair share to our research projects, two of which we will submit to publication by early February. While much of my success is attributable to my determination, I recognize that a significant portion of it is due to my good fortune; without the patient advisors and brilliant collaborators who helped me discover my passion and advance in it, surely, I would not be where I am today.

Thus, I have been taking action to help students who may not be as lucky as I have been. To expose students to the academic path and to the excitement of doing research, I will soon be speaking at my alma mater, Las Positas Community College. To give representation to ex-community-college students in research, I spoke (as the only transfer student) on the UCLA transfer research panel. Lastly, to pave a path for future transfers, I have been working with the UCLA engineering transfer center to create a program to guide, provide tools, and support transfers who are interested in PhD-oriented research. To say the least, this has been extremely fulfilling.

As a PhD student, I plan to further extend my advocacy efforts. In the short term, I am working on creating several PDF resources for community college students, explaining how and why, in my experience, they should go about chasing their academic passions. In the intermediate-term, I hope to speak on behalf of more transfer centers and at more community colleges, exposing (ex) community college students to the academic path. In the long term, I hope to use the credibility I would have established through my research and advocacy to convince the California Community Colleges Association to create "California Community College Research Day," a day dedicated to encouraging community college students to pursue research.

While difficult work on deep societal factors is needed to close the 13x disparity in PhD propensity, I'd feel extremely honored even if my efforts made even a single community college student feel like (s)he could make a difference and become a world class scientist or engineer.